

REMARKS/ARGUMENTS

Claims 1, 3-20, 24-28 and new claim 29 are pending in the application. Reconsideration and a withdrawal of the outstanding objections and rejections is requested in view of the above amendments and the following remarks.

RESTRICTION REQUIREMENT

Applicant is pleased that the Examiner has indicated that the Group II claims 24-26 are now included in the Group I prosecution, and wishes to thank the Examiner for the careful consideration given to this point and for a thorough examination of the application.

Accordingly, claims 1-20 and 24-26 and 28 are the subject of the examination.

AMENDMENTS TO CLAIM 1

Claim 1 has been amended to recite a preferred embodiment of the invention wherein the concentration is from about 0.005 to about 0.9 mg/l. The amendment is fully supported by the specification (see p. 5, lines 24-27) and no new matter has been introduced. Applicant discusses the distinctions over the cited references below. Accordingly, the pending claims should be patentable over the cited art.

Claim 2 has been amended to recite a preferred concentration range of the at least one aromatic halogen derivative to be from about 0.005 to about 0.5 mg/l.

No new matter has been introduced and the amendments are fully supported by the specification.

THE SECTION 112 OBJECTION TO THE SPECIFICATION

The disclosure has been reviewed and a substitute specification is being submitted herewith, including a red-lined version marked to show the immediate changes from the original filed specification. No new matter has been introduced, and the Examiner's suggestions on pages 2-3 of the Office Action have been followed and addressed by Applicant.

Reconsideration and a withdrawal of the objection to the disclosure is requested.

THE CLAIM OBJECTIONS

Claims 25 and 26 were objected to as being dependent on a claim that has since been canceled. These claims have been amended to depend from claim 24. Accordingly, the objection is believed to be obviated.

THE SECTION 112 REJECTION OF CLAIMS 16 and 20

Claims 16 and 20 stand rejected under 35 USC 112 as being indefinite. This rejection is respectfully but strenuously traversed and reconsideration and a withdrawal of the rejection are hereby requested.

Applicant has amended claim 16 as suggested by the Examiner to include the word --organic -- so as to provide proper antecedent basis.

As to claim 20, the word -- and -- has been inserted before the last compound recited in the Markush group listing.

Accordingly, for the above reasons, the 112 rejection with respect to claims 16 and 20 should be withdrawn.

THE SECTION 112 REJECTION OF CLAIMS 1-20, 24-26 and 28

Claims 1-20, 24-26 and 28 stand rejected under 35 USC 112 as being incomplete. This rejection is respectfully but strenuously traversed and reconsideration and a withdrawal of the rejection are hereby requested.

The Examiner has indicated that claim 1 does not recite copper. Though it is evident from the disclosure and the claim itself that the solution for depositing copper coatings would contain copper, Applicant in order to more particularly articulate the invention has amended claim 1 to recite “copper ions”. No new matter has been introduced and the claim is fully supported by the specification.

Claim 1 also has been rejected because of the language appears to include the possibility that R1-R6 are all hydrogens. By definition of the claim, the compound of formula (I) is an “aromatic halogen derivative”, so therefore, whatever the radicals are, they are radicals that form an aromatic halogen derivative. However, in order to more particularly define the invention, Applicant has amended claim 1 to recite the language that “. . . with the proviso that the number of radicals R1, R2, R3, R4, R5 and R6 which are halogen ranges from 1-5 and that the number of radicals R1, R2, R3, R4, R5 and R6 which are hydrogens ranges from 1-5 . . .” The amendment would preclude the possibility where R1 through R6 are all hydrogens (e.g., benzene).

For the above reasons, reconsideration and a withdrawal of the section 112 rejection is respectfully requested.

THE SECTION 102/103 REJECTION OVER COBLEY ET AL. (Solution)

Claims 1-3, 8-16, 19-20 and 28 stand rejected under 35 USC 102(e) as being anticipated by, or in the alternative, under 35 USC 103(a) as being obvious over Cobley et al. This rejection is respectfully but strenuously traversed and reconsideration and a withdrawal of the rejection are hereby requested.

Cobley et al. refers to a metal plating bath containing aldehyde compounds that prevent or reduce the consumption of metal plating additives (abstract). Cobley et al. provides that the metal plating bath maybe a copper plating bath (col. 5, lines 48-49). It may contain brighteners which may be sulfur compounds (col. 8, lines 4-19) and oxygen containing high molecular weight compounds (col. 8, lines 20-29). Furthermore, this plating bath may contain aromatic and non-aromatic aldehydes, such aldehydes including compounds having the formula $R_1\text{-CHO}$ (col. 5, lines 43-51), wherein R_1 may have a variety of meanings. One such compound may be 2-chloro-4-hydroxybenzaldehyde (col. 6, lines 34-35). The concentration of these compounds is from about 0.001 g/L to about 100 g/L of bath, preferably from about 0.01 g/L to about 20.0 g/L (col. 6, lines 64-67). The aldehyde additives are taught to be added typically at a concentration of about 0.1 g/L (col. 13, lines 11-12) in Example 1 and at a concentration of about 1 g/L (col. 14, lines 12-14) in Example 2.

Accordingly the concentration used according to the present invention is much lower than the concentration taught to be used in Cobley et al. (or even Gabe et al. – see below). It is for this reason that the solution as claimed is not anticipated by either Cobley et al. or Gabe et al. (as discussed below).

Claim 1 has been amended to more particularly distinguish the invention by reciting a concentrator range for the aromatic halogen derivative or the salt thereof to be relatively low, from 0.005 to 0.9 mg/l (See par. [0022] of the published specification).

The present application further teaches that a concentration which is above the upper range as that now recited in claim 1 (which is now up to 0.9 mg/l) will not meet the requirement set out in the present application: A prerequisite of producing smooth surfaces of copper coatings is that the solution to deposit such coatings permits high leveling of the surface to be coated. High leveling however has proved to yield surfaces having a disadvantageous fine roughness, including pittings and nodules. Such roughness severely affects the decorative appearance of large area parts in particular (WO 2005/014891 A2: page 2, lines 20-23).

The Example of the Invention 1b provided in the present application (WO 2005/014891 A2: page 16, lines 7-16) shows the quality of a copper surface obtained with a plating bath which contained an aromatic halogen derivative (4-chloro-3,5-dimethylphenol) of general formula 1 of the present invention at a concentration of 0.1 mg/l. The coatings produced were mirror-polish and well leveled. They did not show any voids.

The Comparative Example 1c shown in the present application (WO 2005/014891 A2: page 16, lines 18-23) shows the quality of a copper surface obtained with a plating bath which contained an aromatic halogen derivative (same compound as before: 4-chloro-3,5-dimethylphenol) at a concentration of 76 mg/l. The coatings were not bright but rather had a mist-type appearance being comprised of a plurality of pittings and nodules.

The further Comparative Example 1d shown in the present application (WO 2005/014891 A2: page 16, lines 25-29) shows the quality of a copper surface obtained with a plating bath which contained an aromatic halogen derivative (same compound as before: 4-chloro-3,5-dimethylphenol) at a concentration of 152 mg/l. The coating produced was matte and could therefore not be used as a decorative coating.

The above experiments show that the concentration of the additives used is very sensitive to the quality of the coating obtained. If the concentration is large, the quality is such that the coatings obtained are not satisfactory for decorative purposes, whereas, with low level application of the additives, excellent results are achieved.

Both Cobley et al. and Gabe et al. teach using a relatively large concentration. In fact, both references use the additives, Cobley et al. use aldehyde compounds and Gabe et al. use alcohols, to inhibit or retard or prevent or reduce the consumption degradation of plating bath additives, which is due to oxidation of the additives (for example, Cobley et al.: col. 10, lines 1-6). In order to do so, it is well-understood by those of ordinary skill in the art, that the concentration of the compounds to inhibit the degradation of the other additives must be present in a much larger amount than the latter additives because they are consumed while inhibiting, retarding, preventing or reducing consumption/degradation of the plating bath additives. Contrary to this, the aromatic halogen derivatives of the present invention are active agents which directly interact with the plating process and whose purpose is not to reduce or prevent degradation of the bath additives. Therefore, the compounds are not required to be present in the plating solution in a large amount.

Due to the different action, those skilled in the art would not consider it appropriate to use the aldehyde compounds of Cobley et al. and the alcohols of Gabe et al. at a lower concentration as indicated in these references.

Accordingly, the cited references actually teach away from the Applicant's present invention. The applicable legal precedent supports the Applicant's position against the rejection because each reference actually teaches away from what is claimed as the Applicant's invention.

A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be led in a direction divergent from the path that was taken by the applicant.

In re: Gurley, 27 F.3d 551, 31 U.S.P.Q. 2d 1130 (Fed. Cir. 2006).

Accordingly, for these reasons, reconsideration and a withdrawal of the rejection is respectfully requested.

NEW CLAIM 29.

New claim 29 has been added to more particularly define the invention and round out coverage for the invention. New claim 29 recites an embodiment wherein the aromatic halogen derivative of formula (I) excludes 2-chloro-4-hydroxybenzaldehyde, a compound that the Examiner referred to as being disclosed by Cobley et al. For the above reasons distinguishing the present invention over Cobley et al., and for these additional reasons, the present invention, as recited in claim 29, is not disclosed by or obvious in view of the cited references.

THE SECTION 102/103 REJECTION OVER COBLEY ET AL. (Method)

Claims 24-26 stand rejected under 35 USC 102(e) as being anticipated by, or in the alternative, under 35 USC 103(a) as being obvious over Cobley et al. as applied to claims 1-3, 8-16, 19-20 and 28, above. This rejection is respectfully but strenuously traversed and reconsideration and a withdrawal of the rejection are hereby requested.

For the same reasons as those set forth above, reconsideration and a withdrawal of the rejection is respectfully requested.

THE SECTION 102/103 REJECTION OVER GABE ET AL. (Solution)

Claims 1-2, 4-16, 19-20 and 28 stand rejected under 35 USC 102(e) as being anticipated by, or in the alternative, under 35 USC 103(a) as being obvious over Gabe et al. This rejection is respectfully but strenuously traversed and reconsideration and a withdrawal of the rejection are hereby requested.

First, for the same reasons as those set forth above, reconsideration and a withdrawal of the rejection is respectfully requested.

Second, in particular, the present invention is not anticipated by nor obvious over Gabe et al. Gabe et al. refers to a metal plating bath containing alcohol compounds that inhibit or retard the consumption of plating bath additives (abstract). The metal plating bath may be a copper plating bath (col. 4, lines 44-45). It may contain brighteners which may be sulfur compounds (col. 9, lines 34-55) and oxygen containing high molecular weight compounds (col. 9, lines 56-64). Furthermore, this plating bath may contain alcohols, for example alkyl, alkenyl, alkynyl alcohols, unbranched and branched, as well as aromatic alcohols (col. 5, lines 55-61). For example, 4-chlororesorcinol and 3-chlorophenol are mentioned as preferred alcohols (col. 7, lines 53-57). The concentration

of these alcohols is from about 0.001 g/L to about 100 g/L of bath, preferably from about 0.01 g/L to about 20.0 g/L (col. 8, lines 37-40). The alcohols are taught to be added at a concentration of 1.0 g/L (ascorbic acid; col. 14, lines 30-32) in Example 1, 0.1 g/L (col. 15, lines 33-35) in Example 2 and 1.0 g/L (col. 16, lines 48-50) in Example 3.

Accordingly, as discussed above in support of the patentability of the Applicant's present invention over the Cobley et al. reference, the present invention also should be patentable over Gabe et al.

Reconsideration and a withdrawal of the rejection if respectfully requested.

THE SECTION 102/103 REJECTION OVER GABE ET AL. (Method)

Claims 24-26 stand rejected under 35 USC 102(e) as being anticipated by, or in the alternative, under 35 USC 103(a) as being obvious over Gabe et al. (U.S. Patent No. 6,773,573 B2) as applied to claims 1-2, 4-16, 19-20 and 28, above. This rejection is respectfully but strenuously traversed and reconsideration and a withdrawal of the rejection are hereby requested.

For the same reasons as those set forth above, reconsideration and a withdrawal of the rejection is respectfully requested.

THE SECTION 102/103 REJECTION OVER COBLEY ET AL. (Solution)

Claim 7 stands rejected under 35 USC 103(a) as being obvious over Cobley et al. as applied to claims 1-3, 8-16, 19-20 and 28, above. This rejection is respectfully but strenuously traversed and reconsideration and a withdrawal of the rejection are hereby requested.

For the same reasons as those set forth above, reconsideration and a withdrawal of the rejection is respectfully requested.

THE REJECTIONS IN VIEW OF TODT

Claims 17 and 18 stand rejected under 35 USC 102(e) as being anticipated by, or in the alternative, under 35 USC 103(a) as being obvious over Cobley et al. as applied to claims 1-3, 8-16, 19-20 and 28, above, and further in view of Todt et al. (U.S. Patent No. 3,743,584). This rejection is respectfully but strenuously traversed and reconsideration and a withdrawal of the rejection are hereby requested.

For the same reasons as those set forth above, reconsideration and a withdrawal of the rejection is respectfully requested.

Claims 17 and 18 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Gabe et al. (U.S. Patent No. 6,773,573 B2) as applied to claims 1-2, 4-16, 19-20 and 28 and in further view of Todt et al. (U.S. Patent No. 3,743,584). This rejection is respectfully but strenuously traversed and reconsideration and a withdrawal of the rejection is hereby respectfully requested.

For the same reasons as those set forth above, reconsideration and a withdrawal of the rejection is respectfully requested.

For the above reasons, the rejections should be withdrawn.

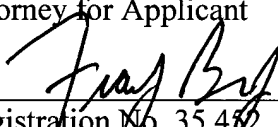
If necessary, an appropriate extension of time to respond is respectfully requested.

This reference is referred to in the Office Action.

The Commissioner is authorized to charge any additional fees which may be required to Patent Office Deposit Account No. 05-0208.

Early action on the case and examination of the pending claims is hereby earnestly solicited.

Respectfully submitted,
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